

## BACKGROUND OF THE INVENTION

**1. Technical Field:**

The invention concerns an actuating device for miniature keyboards or input tablets with an actuating element which is shaped in the form of a pen and has a tip adapted to the size of the keys or tablet fields, in particular for use with palmtop computers.

## 2. Description of the Related Art:

Miniaturized electronic devices such as palmtop computers, input tablets, watches, medical equipment and suchlike have miniature keys or input panels which, as a result of the mismatch in size between the touch area and the width of the finger, are in some cases difficult to operate. In order to enable safe actuation of miniature keyboards, specially adapted pens are used. The actuation of keys with pens of this kind is, however, awkward and time-consuming.

A miniaturized interface device wearable on the finger to generate a digital input into information processing devices is also known (US Patent 4,954,817). The device has a finger palette and a stylus ring which are worn on various fingers and which in their interaction perform the function of a digital input tablet and a conventional mouse input device. For this,

the finger palette is worn on the index finger and the stylus ring on the thumb of the same hand. When the two fingers are brought together the stylus ring can be used to select a specific coordinate on the finger palette and generate a corresponding input into a connected computer, while the fingertips remain free for simultaneous operation of a keyboard. The operation of miniaturized keyboards plays no role in this known device.

**SUMMARY OF THE INVENTION**

An object of the invention is to provide a simple and user-friendly actuating device for miniature keyboards or miniature input tablets.

A further object of the invention is to provide an actuating device for miniature keyboards or miniature input tablets which is worn on the finger, which is light in weight, and which does not place a strain on the fingers and hand and does not impede the movement of the fingers.

A further object of the invention is to provide an actuating device for miniature keyboards or miniature input tablets which is worn on the finger and which permits quick and uncomplicated fitting on and removal from the finger.

In accordance with the invention as defined in the Claims, a dome-shaped body is adapted to the curve of the fingertip and fitted to the fingertip by means of a removable adhesive bond. The dome-shaped body has a pin-shaped projection on its convex side which serves as the actuating element. The dome-shaped body is made of a soft plastic material which molds to the fingertip. On the concave side of the dome is an adhesive layer which permits repeated fitting and removal of the dome to and from the fingertip.

The device in accordance with the invention is suitable for actuation of miniaturized keyboards and for



**BRIEF DESCRIPTION OF THE DRAWINGS**

Various embodiments of the invention are described in the following on the basis of drawings:

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**Figure 1** shows a schematic view of a human finger fitted with the actuating device in accordance with the invention.

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**Figure 2** shows a perspective of a first embodiment of the device in accordance with the invention.

**Figure 3** shows a section through the device as shown in **Figure 2**.

**Figure 4** shows a section through a further embodiment of the device in accordance with the invention.

**Figure 5** shows a perspective of the device as shown in **Figure 4**.

**Figure 6** shows a section through a third embodiment of the device in accordance with the invention.

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**Figure 7** shows a perspective of the device as shown in **Figure 6**.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Figure 1 shows a schematic view of a human finger with an actuating device 10 fitted to the fingertip. The embodiment of the actuating device 10 in accordance with the invention presented in Figures 2 and 3 comprises a dome 12, a pin 14 and the convex outer side 15 of the dome 12 and a thin layer 18 applied to the concave inside 16 of the dome 12, said thin layer having an adhesive coating. The dome 12 is preferentially circular around its circumference and is made of a soft plastic material such as polyethylene or PVC, which adapts itself to the shape of the fingertip. The pin 14 is rotationally symmetric and is manufactured as a separate part. It is made of a harder plastic, which may likewise be polyethylene or PVC. The pin 14 is widened at its base and is inserted into an opening in the dome 12 and permanently joined to it, wherein its base surface 17 is adapted to the concave surface 16 of the dome 12 and forms one surface with it. In this position the pin 14 is permanently joined to the dome 12 and the layer 18.

The dome 12 is made of a fine-pored synthetic foam, such as Styrofoam from Dow Chemical, or any standard commercially available mousse foam. The layer 18 is an adhesive bonded layer. A standard commercially available adhesive which permits repeated removal and refitting in the manner of a sticking plaster is suitable as the bonding agent. The layer 18 also has a large number of small perforations 19 which serve to absorb deposits of

perspiration on the fingertip.

For use, the dome **12** is fitted on the finger and pressed on, and adheres to the fingertip by means of the adhesive layer. For one-handed operation of miniature electronic devices such as palmtop computers or mobile phones, the dome **12** is preferentially fitted on the thumb, since the thumb is able to cover a wide range of movement and permits positioning of the pin **14** on the keys of the device. The free end of the pin **14** is adapted to the shape of the keys being pressed, and may be pointed or rounded or have a small flattening on its tip. On every press of a key the dome **12** is pressed back onto the tip of the thumb, so that a safe fitting of the dome on the finger is ensured. The dome **12** may instead also be fitted on the tip of the index finger in order to enable two-handed operation or to operate miniaturized input tablets. A number of domes **12** can also be fitted simultaneously on several fingers. Since the domes are small in area, mutual impeding of the fingers as a result of the fitted domes is largely avoided.

**Figures 4 - 7** show further embodiments of the invention. In the embodiment of the invention as presented in **Figures 4** and **5**, a dome **20** and a pin **22** are formed as one combined part made of a plastic material such as polyethylene or PVC. The hardness of this material is chosen such that it molds to the shape of the fingertip but is still hard enough for the pin **22** to perform its function as an actuating element. The dome **20** is preferentially manufactured as a rotationally

symmetric molding and on its inside facing the finger forms a bell-shaped cavity **24**. The pin **22** has at its base a funnel-shaped extension **25** which ends at the rim **21** of the dome and forms a further cavity **26**. In the area of the rim **21** of the dome a ring-shaped layer **28** is affixed, corresponding to the layer **18** in **Figures 2** and **3**. The layer comprises a fine-pored synthetic foam and bears an adhesive coating which permits repeated removal and rebonding.

When the dome **20** is fitted on the fingertip a vacuum is created in the cavities **24** and **26** which generates a suction effect in the two cavities **24** and **26**. This supports the adhesive power of the adhesive layer **28** and additionally stabilizes the pin **22** when the device is in use, thereby assisting the safe fitting of the dome **20** on the finger. The embodiment of the invention as shown in **Figures 4** and **5** is characterized in particular by its light weight.

In the embodiment of the invention as shown in **Figures 6** and **7**, a dome **30** and a pin **32** are formed as a single part made of a plastic material, such as polyethylene or PVC, as in the embodiment of the invention shown in **Figures 4** and **5**. The dome **30** is manufactured as a rotationally symmetric molding, shaped like a bell with a relatively thin wall **34**. In the central part of the dome **30** the wall **34** merges into the pin **32**. In the area of the rim **31** of the dome a ring-shaped layer **36** is affixed, corresponding to the layer **28** in **Figures 4** and **5**. The layer is formed as an adhesive



bonding layer and permits repeated removal and rebonding. On the concave side of the dome **30** is a lenticular felt inlay **38** which fills out the interior of the bell and stabilizes the dome **30** and the position of the pin **32**.

When the dome **30** is fitted on the fingertip the adhesive layer **28** bonds to the finger. By pressing the dome **30** onto the finger the felt inlay **38** is compressed to a certain extent, thereby creating a vacuum in the area surrounding the felt inlay **38** which generates a suction force which in turn assists the adhesive power.

The invention has been described on the basis of embodiments of the invention. Derivations of the embodiments shown and described, or other embodiments of the invention, lie within the framework of the following Claims.